Chemical Bonding and Reactions

PS-4 The student will demonstrate an understanding of chemical reactions and the classifications, structures, and properties of chemical compounds.

PS-4.10 Recognize simple chemical equations (including single replacement and double replacement) as being balanced or not balanced.
Taxonomy Level: 1.1-B Remember Conceptual Knowledge

Key Concepts:
Single replacement reaction
Double replacement reaction

Previous/Future knowledge: Students in the 7th grade "explained how a balanced chemical equation supports the law of conservation of matter" (7-5.8).
In Physical Science students expand the concept of balanced chemical equations by recognizing when certain equations are balanced or not balanced.

It is essential for students to know

- That a *single replacement* (displacement) reaction is a reaction in which one element takes the place of another element in a compound. For example:
  $Zn + 2\,HCl \rightarrow ZnCl_2 + H_2$
- That a double replacement (ionic exchange) reaction is a reaction in which there is an apparent exchange of atoms or ions between two compounds. For example:
  $FeS + 2\,HCl \rightarrow H_2S + FeCl_2$
- That a balanced equation represents a chemical reaction that rearranges atoms but does not create or destroy them. For each element, the number of atoms on the reactant side must equal the number of atoms on the product side.
- The meaning of the coefficients and subscripts with respect to how many atoms are represented.

It is not essential for students to balance single replacement or double replacement (ion exchange) reactions, only recognize that they are balanced.

Assessment Guidelines:
The objective of this indicator is to *recognize* that chemical reactions are balanced, therefore, the primary focus of assessment should be to *recall* what makes an equation balanced and *identify* an equation as balanced or not balanced.